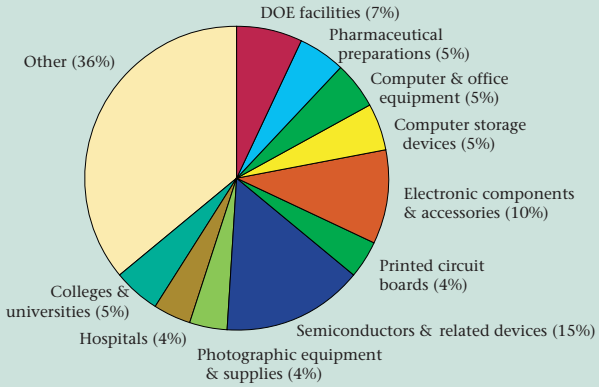
Environmental Technologies

Energy Efficiency in Buildings for High-Tech Industries

California's laboratories and cleanrooms have unique environmental needs that are extremely energy-intensive. HVAC energy intensities are four to 100 times higher than those of ordinary buildings. This market is large and growing with the trend toward more energy-intensive spaces. In California these facilities consume **9.4 billion kilowatt-hours** of electricity and **25 trillion BTUs** of natural gas each year. Opportunities for energy savings are real:

- 30 to 50% savings in energy use are possible
- HVAC systems can consume 50% of facility energy
- New technology for fume hood design saves 70%
- There is wide variation in existing HVAC efficiencies
- Energy *is* a controllable cost

The opportunity is cross-cutting and involves a number of industries:



Opportunities Are Real

Genentech—Bulk Manufacturing Building

The site's six buildings include:

- 180,000-ft^2 manufacturing building with various cleanliness classes and 10 air-handling units (approx. 400,000 cfm)
- Central utility plant with 3400 tons of chilled water

Annual Energy Savings	**$552,800/yr**
Project Payback (including incentives)	**1.7 years**

High-Tech Buildings Project Objectives

- **Design Intent Documentation:** Capture design intent information & performance expectations for use throughout the building's life cycle.
- **Laboratory Fume Hood Containment:** Reduce fume hood air-flow requirements by at least 50%.
- **Laboratory Airflow Design:** Develop airflow design criteria and tools to optimize fan power consumption.
- **Laboratory Field Studies/Performance Feedback:** Develop a standard methodology for benchmarking complex laboratory facilities. Provide performance feedback to designers and operators.
- **Cleanrooms for the Future:** Improve energy efficiency and performance of cleanrooms.
- **Technology Transfer:** Develop design guides, web sites, workshops, and other technology transfer mechanisms.
- **Industry Liaison:** Form collaborative alliances with industry organizations to assure success in the marketplace.

Ultra Low-Flow Fume Hood

- Patent Pending
- Option Agreement signed for product development in microelectronics field
- Passed ASHRAE 110 test

Future Activies

- Filter technologies including efficient fan-filter units
- Efficient mini-environments
- Particle detection technology
- Design tools
- Field-test laboratory fume hood
- Continue benchmarking

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